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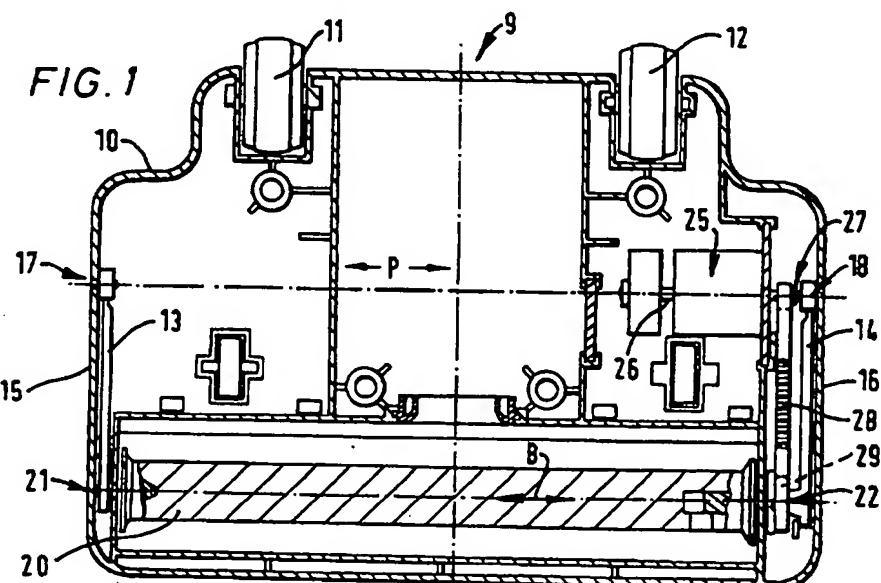
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(54) Abstract Title

Brush arrangement attached to a cleaner workhead via swinging arms

(57) A brush arrangement comprising a cylindrical brush member 20 which is attached to a vacuum cleaner workhead by one or more swinging arms 13, 14. Each arm is pivotably attached at one end region 17, 18 to the workhead and at the other end region 21, 22 to attached to the brush member 20, permitting displacement of the brush member 20 through an arc having a radius defined by the length of the swinging arm 13,14. Preferably there are two arms 13, 14 and the arms are attached at the axis of rotation B of the brush member 20. The drive means for the brush member may comprise a belt 28. The drive shaft 26 of the motor 25 may be co-axially mounted with respect to the pivot axis P of the swinging arm 13, 14 to ensure uniform belt tension. Alternatively the distance of the drive shaft axis from the pivot axis may be adjustable to vary the degree to which the brush member 20 is urged towards the floor.



GB 2 336 994 A

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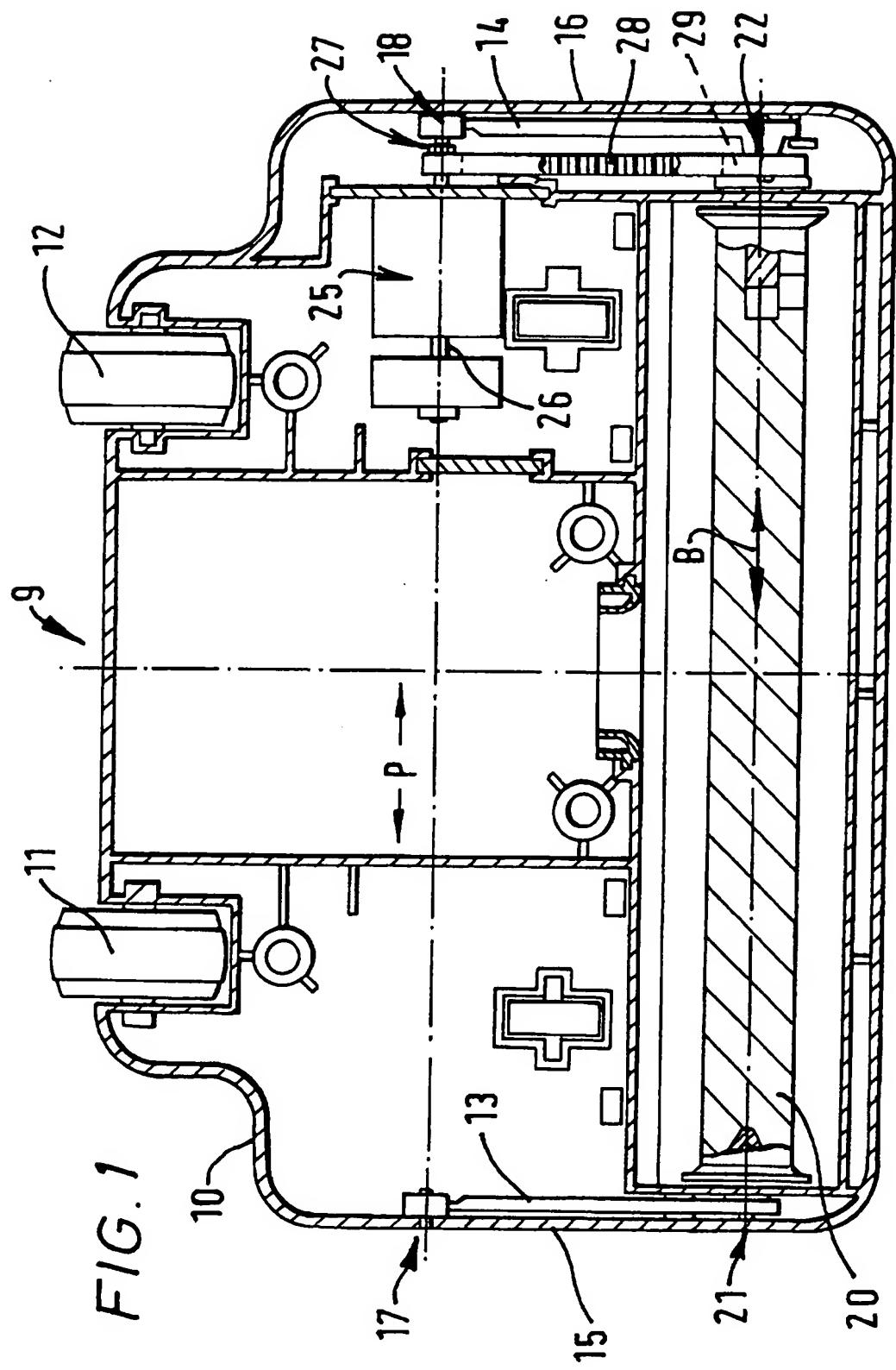


FIG. 1

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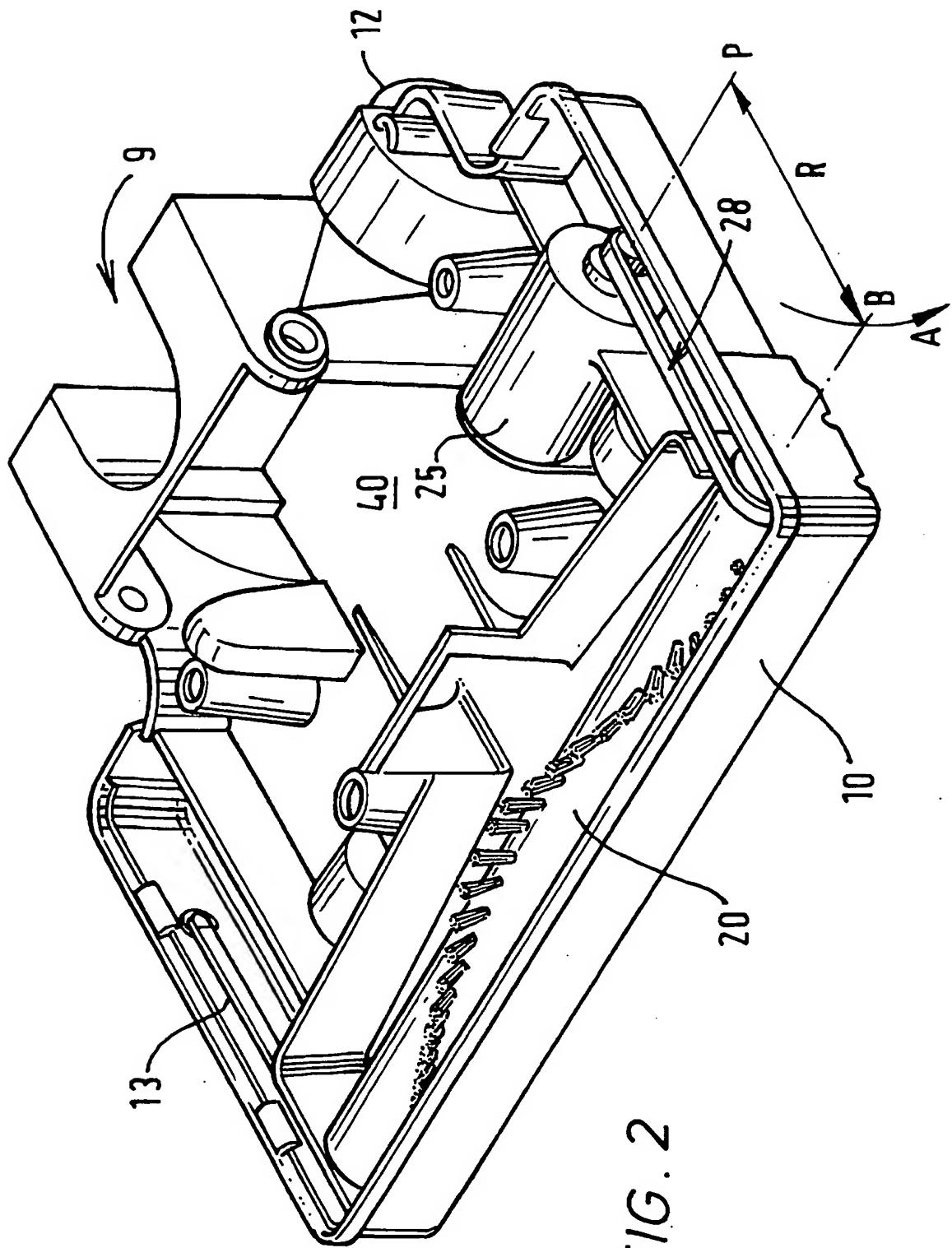


FIG. 2

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Rotating Brush Arrangement for Vacuum Cleaner

The present invention concerns the field of vacuum cleaners and in particular relates to brushes 5 incorporated in vacuum machines in order to lift dirt and debris from a floor surface, particularly carpeting or matting.

It is an object of the present invention to provide an 10 improved brush arrangement for a vacuum cleaner.

According to the present invention there is provided a brush arrangement for a vacuum cleaner, which arrangement comprises a cylindrical brush member adapted to be 15 rotated by brush drive means, which brush member is attached to a vacuum cleaner workhead by means of one or more swinging arms, each of which swinging arms is pivotably attached to the vacuum cleaner head at one end region thereof and attached to the brush member at 20 another end region thereof, the arrangement being such that the swinging arms permit displacement of the brush member through an arc having a radius substantially defined by the distance between the said end regions of the swinging arm.

When the brush member is rotated in use by the drive means the reaction acting on the swinging arms will tend to urge the brush member against the surface being brushed.

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This arrangement has many advantages, in particular it provides automatic height adjustment because the brush member will always be urged into close contact with the surface being cleaned, no matter what the depth of the 10 carpet pile or unevenness of the surface. Thus the usual variable ride height mechanisms of prior art cleaners can be omitted and the dust slot entry to the plenum vacuum chamber can be maintained at the optimum height for dust / dirt collection.

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In one embodiment of the invention the brush member is rotatably attached to the swinging arm or arms at the axis of rotation of the brush member. In one embodiment there are two swinging arms, adapted to rotatably carry 20 therebetween the brush member.

The drive means may comprise an electric motor. In one embodiment the drive means includes a belt or chain drive arrangement between the motor and the brush member. 25 Alternatively gear drive may be used, for example located

on a member adapted to move with a swinging arm.

In one aspect of the invention a drive shaft of the motor is co-axially mounted with respect to the swinging arm 5 or arms' pivot axis. This ensures that uniform belt tension is maintained during displacement of the brush member.

In another aspect of the invention the drive shaft of the 10 motor may be displaced from the axis of pivoting of the swinging arm or arms. In this way the apparatus may be arranged so that, in use, as the brush member is displaced the increased belt tension tends to urge the brush member back against the surface being cleaned. The 15 distance of the drive shaft axis of rotation from the swinging arm pivot axis may be adjustable to vary the degree to which the brush member is urged against the floor surface.

20 The invention is suitable for use a range of cleaners, For example it finds application with domestic and industrial upright vacuum cleaners, as well as "bin" type cleaners having a cleaning head mounted at one end of a tubular arm or "wand" in communication with bin-mounted 25 vacuum drive and dust collector.

Following is a description by way of example only and with reference to the drawings of one method of putting the present invention into effect.

5 Figure 1 is a horizontal sectional view through a vacuum cleaner workhead according to the present invention.

Figure 2 is a cut away perspective view from above and one side the interior of the vacuum cleaner work head
10 shown in figure 1.

In figure 1 a vacuum cleaner workhead housing is shown as 10. The housing and associated vacuum cleaner apparatus is of the usual prior art configuration and
15 construction with the exception of the features of the invention described hereafter.

Two spaced apart rollers 11,12 are rotatably carried at a rear edge region 9 of the housing. Two swinging arms
20 13,14 are pivotally attached to respective inside surfaces of the housing side walls 15,16. The pivot points 17,18 of the swinging arms are coaxial and located at mid regions of the side walls. The swinging arms extend forwardly in the housing either side of a
25 cylindrical elongate brush member 20. The brush member

20 is accommodated in a forward portion of the housing. The brush member is carried between distal ends 21,22 of the swinging arms. The brush member is rotatably connected to the distal ends of the swinging arms via 5 respective conically configured bearings 23,24.

On one side of the housing there is mounted an electric motor 25. In a preferred embodiment the motor is a operates by switched reluctance, but other types of 10 electric motor can be used in the invention. The motor has a drive shaft 26. The drive shaft is located coaxially with the swinging arm pivot points 17 and 18. The drive shaft exits from the motor adjacent the pivot point 18 as shown in figure 1. The drive shaft carries 15 a toothed pinion gear 27. The pinion gear engages with one end loop of a toothed drive belt 28. The other end loop of the drive belt is looped over a driven gear 29 disposed at one end of the brush member. The driven gear is coaxially connected to the drive member so that 20 rotation of the drive gear causes rotation of the brush member.

In figure 2 components described with reference to figure 1 have identical reference numerals. The brush member 20 25 carries the usual wave arrangement of bristles upstanding

from its outside surface. In use, rotation of the motor 25 in an anticlockwise direction causes the brush to rotate and lift and eject dirt and debris rearwardly into a vacuum plenum chamber 40 accommodated in the housing.

- 5 Because the brush is mounted between two ends of the swinging arms, in use it is urged downwardly in the direction of the arrow A in figure 2, through an arc of a radius R equal to the distance between the swinging arm pivot axis P and the brush member axis of rotation B.

CLAIMS

1. A brush arrangement for a vacuum cleaner, which arrangement comprises a cylindrical brush member adapted to be rotated by brush drive means, which brush member is attached to a vacuum cleaner workhead by means of one or more swinging arms, each of which swinging arms is pivotably attached to the vacuum cleaner head at one end region thereof and attached to the brush member at another end region thereof, the arrangement being such that the swinging arms permit displacement of the brush member through an arc having a radius substantially defined by the distance between the said end regions of the swinging arm.
- 15 2. An arrangement as claimed in claim 1 wherein the brush member is rotatably attached to the swinging arm or arms at the axis of rotation of the brush member.
- 20 3. An arrangement as claimed in claim 1 or claim 2 wherein there are two swinging arms, adapted to rotatably carry therebetween the brush member.
- 25 4. An arrangement as claimed in claim 3 wherein the drive means comprises an electric motor and a belt or chain

drive arrangement between the motor and the brush member.

5. An arrangement as claimed in claim 4 wherein a drive shaft of the motor is co-axially mounted with respect to
5 the swinging arm or arms' pivot axis there by to ensure that uniform belt tension is maintained during swinging displacement of the brush member.

10 6. An arrangement as claimed in any of claims 1 to 4 wherein the drive shaft of the motor may be displaced from the axis of pivoting of the swinging arm or arms such that, in use, as the brush member is displaced the increased belt tension tends to urge the brush member back against the surface being cleaned.

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7. An arrangement as claimed in claim 6 wherein the distance of the drive shaft axis of rotation from the swinging arm pivot axis is adjustable to vary the degree to which the brush member is urged against the floor
20 surface.

8. A vacuum cleaner comprising a brush arrangement according to any of the preceding claims.



Application No: GB 9909718.0
Claims searched: 1-8

Examiner: Ceri Witchard
Date of search: 13 August 1999

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.Q): A4F (FSND)

Int Cl (Ed.6): A47L (5/05 5/26 5/30 9/04)

Other: Online: wpi epodoc japiro

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2074850 A (VORWERK & CO) See figures 1 and 2	1-4
X	GB 1080298 A (MAUZ & PFEIFFER) See figure 2	1-4
X	US 4190923 (VARIN) See column 3 lines 34-55 and figures 1 and 3	1-4

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.